Keywords for Today’s lesson

What do the following words mean? Relate them digital devices and give examples where possible

1. **Protocol**
2. **Establish**
3. **Retrieve**
4. **Client**
5. **Feedback**
6. **Alternative**

Keywords for Today's lesson

What do the following words mean? Relate them digital devices and give examples where possible

1. **Protocol –** a set of rules or procedures
2. **Establish –** to set up something
3. **Retrieve –** to get or bring back from somewhere
4. **Client-** digital device capable of obtaining data from a server
5. **Feedback –** receiving information to the performance of something
6. **Alternative –** something available as another possibility or choice.

Data Transmission Protocols

TOPIC 2 – TRANSMITTING DATA

UNIT 1 – INFORMATION TECHNOLOGY SYSTEMS

FARHAN MUKADAM

Data Transmission Protocols

A protocol is a set of rules that defines a method for transmitting data

Transmits between different devices over a network.

Different digital devices cannot naturally communicate with each other.

The protocol gives a single language for devices to communicate

Types of Protocols

Email

Voice & Video Calls

Web Pages

Email Protocols

SMTP - Simple Mail Transfer Protocol transmits data from your email client to your outgoing mail server

POP3 - The Post Office Protocol is used to download emails from your mail server to your email client.

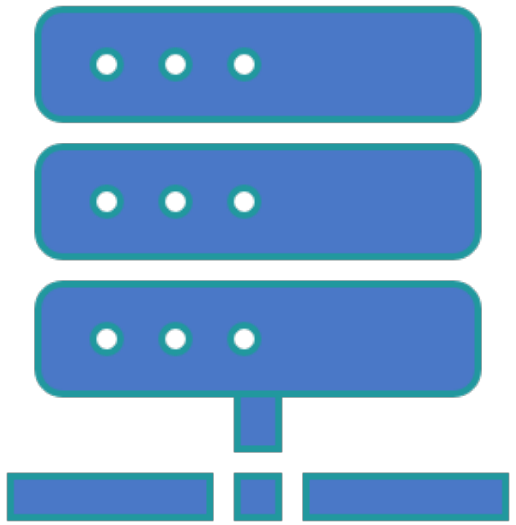
IMAP - The Internet Message Access Protocol is an alternative to POP3 for retrieving emails from your mail server

Voice & Video Calls Protocols

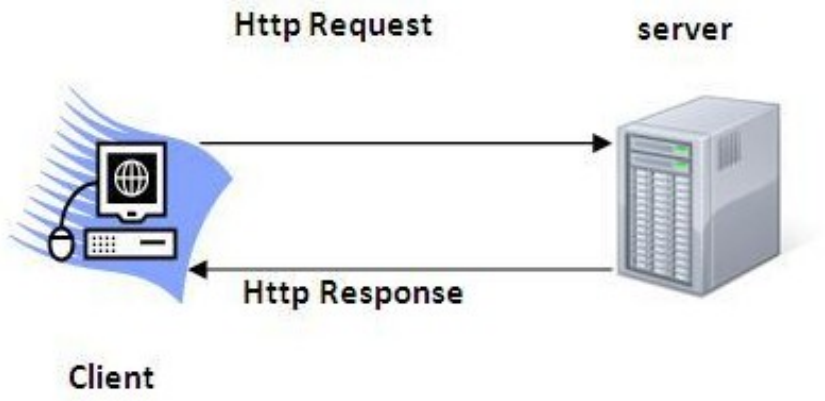
SIP - Session Initiation Protocol is a signaling protocol that establishes the connection between sender & receiver

RTP - Real-Time Transport Protocol works alongside SIP. RTP will transmit the data packets along that connection.

RTCP - RTCPs primary function is to send control packets that provide feedback on the quality of the data delivery.



Web Pages



HTTP - HyperText Transfer Protocol establishes a connection between the client and server and then transfers web pages to the client

HTTPS - Secure version of HTTP that transmits data in a secure encrypted format using either TLS or SSL technologies.

FTP - File Transfer Protocol is the protocol used when transferring files between computers over the internet.

Notes Activity – 20 mins

1. Look through additional slides in the PowerPoint on Data Transmission Issue

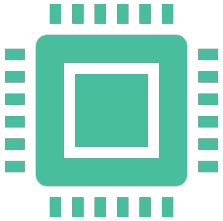
2. Add **additional** notes for each wired connection **- 2 Bullet Points minimum**

3. Add **TCP/IP** to your notes – How does this relate to Data transmission Protocols?

Email - SMTP

The Simple Mail Transfer Protocol is used to transmit data from your email client to your outgoing mail server. It is also used to transmit the data between email servers so that it can move from your outgoing mail server to the recipient’s mail server.

When you want to send an email your client will use SMTP to establish a connection with your outgoing mail server (known as an SMTP server). Once the server lets the client know it’s ready for the message the email can be sent to the server along with the recipient’s mail address.



SMTP will then use the recipient’s email domain to identify their SMTP server and establishes a connection to this server. It then will forward the email to their server ready for the recipient to access it.

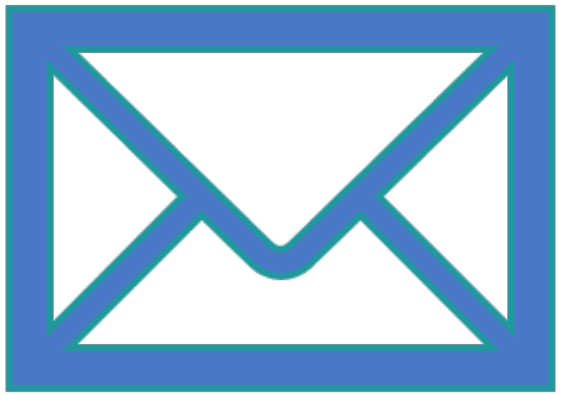
Email – POP3

The Post Office Protocol is used to download emails from your mail server to your email client. The “3” in POP3 is because this is the third version of it.

With POP3 a connection is established between the recipient’s email client and their mail server. Then emails are downloaded to the email client and removed from the mail server.

This has the drawback that you won’t be able to access your emails on multiple devices. As we now often want to do this, POP3 has become less and less popular over the years.

Email - IMAP



The Internet Message Access Protocol is an alternative to POP3 for retrieving emails from your mail server. It works much the same way as POP3 but with the key difference that instead of downloading your emails, they are synced between your client and your server.

This means you will be able to access the same emails on multiple devices, and any change made on one device (such as filing an email in a folder) will be updated on all other devices.

Email Activity

We saw here that there are clear benefits of using IMAP rather than POP3

Are there any benefits of using POP3?

Voice & Video Call – SIP

The Session Initiation Protocol is a signalling protocol that establishes the connection between sender & receiver. We use SIP to establish the location (IP addresses) of the people taking part in the conversation & to agree on the CODECS used for encoding and decoding the voice & video to be transmitted.

A SIP signalling packet is sent from the person establishing the VoIP call to the intended recipient. When the SIP packet is received, this is where the recipients VoIP phone starts to ring.

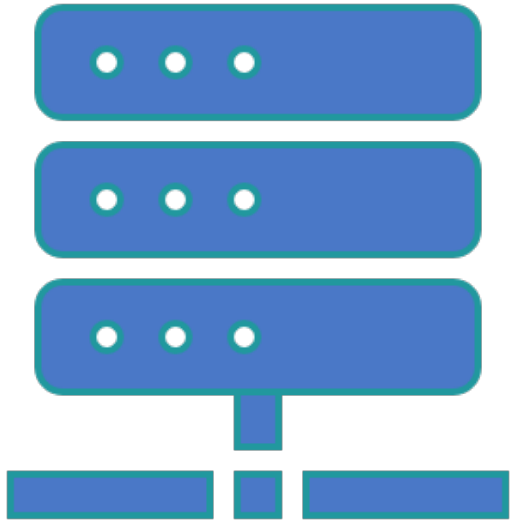
Additional SIP signalling packets are exchanged to agree on CODECs and a SIP response will be sent when the recipient picks up to establish the start of the session. SIP packets are also exchanged when a call is completed to end the VoIP session.

Voice & Video Call – RTP

The Real-Time Transport Protocol works alongside SIP. While SIP is used to establish the connection, RTP will actually transmit the data packets along that connection.

RTP is a protocol built upon the User Datagram Protocol (UDP) which is a more general data transfer protocol that is an alternative to TCP. RTP is built upon UDP because it gives no guarantee for delivery, taking no responsibility for recovering lost packets.

This is largely due to VoIP not offering enough time for retransmission for lost or damaged packets. TCP does guarantee delivery which makes it less efficient (though obviously, this makes TCP more reliable).



Voice & Video Call – RTPCP

The RTP Control Protocol, is a sister protocol to the Real-Time Transmission Protocol. The RTCPs primary function is to send control packets that provide feedback on the quality of the data delivery.

This includes information like bytes sent, packet counts, jitter and round-trip times. This might be used, for example, to decided to change the CODEC being used to improve performance.

Voice & Video Call – Activty

Before SIP the H.323 protocol was used to establish VoIP sessions.

What are the pros and cons of using SIP instead of H.323?

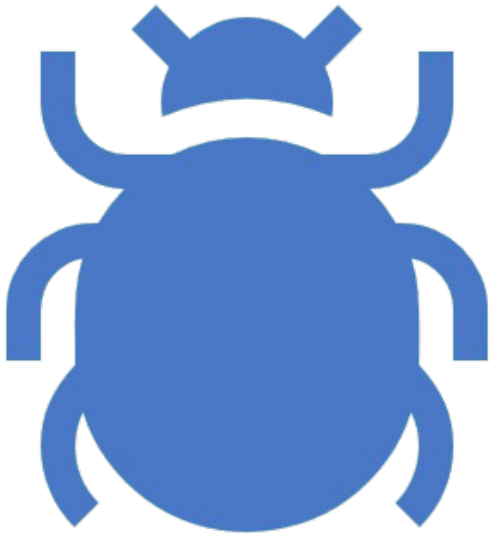
Research this online.

Web Pages - HTTP

The HyperText Transfer Protocol establishes a connection between the client and server and then transfers web pages to the client so they can be rendered by the browser. It also allows the transfer of additional related files, such as images embedded within the page.

When you type a URL into your web browser and press return, an HTTP message will be created that requests for a file from the web server that the URL points to. The server will then send an HTTP response message that contains the file we requested.

If the web page contains additional files, such as images or stylesheets, then additional HTTP messages will be sent and received for each of these files.



Web Pages - HTTPS

The HyperText Transfer Protocol Secure is a version of HTTP that transmits data in a secure encrypted format using either TLS or SSL technologies.

It resolves the major issue of HTTP which is its lack of security

Web Pages - FTP

The File Transfer Protocol is the protocol used when transferring files between computers over the internet. This isn’t specific to web pages, however, it is the common protocol used when uploading web pages to a web server so they can be accessed by users browsing the web.

Using a web servers FTP address, username and password, FTP can establish a connection between a clients computer and the server. This first connection is called the control connection. Once this is established a second connection is established called the data connection.

The control connection is used to administrate the connections and to send commands, while the data connection is used to transfer files between the client and the server.

Why is HTTP used for downloading web pages instead of FTP?

Research this online.

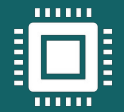
Web Pages - Activity

Data Transmission on Protocols Summary

A protocol is a set of rules that defines a method for transmitting data between different devices over a network.

Email protocols include SMTP for sending emails and POP3 or IMAP for receiving them.

Voice & Video Calls over Internet applications use a variety of different protocols. SIP is a common protocol for establishing a connection while RTP is used for transmitting the data and RTCP is used for providing feedback on the quality of data delivery.



Web pages commonly use HTTP for accessing web pages stored on a server. HTTPS is a version of HTTP that uses encryption for security. FTP is commonly used for uploading web pages onto a serve